

Prof. Kennicutt--

Thank you for forwarding David Branch's referee report on the paper, "New Constraints on Omega\_M, Omega\_Lambda, and W from an Independent Set of Eleven High-Redshift Supernovae Observed with HST". The referees report was thoughtful, and below are our responses to the points raised, including a summary of the changes made to the paper as a result of this report.

Below, where there are page references, they are to the MS58315v1.pdf file as downloaded from the mss.chicago.edu site.

1. We have added the word "negative" after "anomalous", so that the sentence reads "These extinction measurements show no trend of anomalous negative E(B-V) at higher redshifts." This was the intended meaning of the sentence. In the last sentence, to clarify the consistency with current results, we have rewritten the last two sentences of the abstract to make it clearer what we are talking about.
2. Replaced the word "it" with "set"
3. These spectra are in fact in preparation for publication. It is a graduate student of mine who is primarily responsible for the analysis of ~~the~~ these supernovae, although of course he is working closely with the supernova spectra experts in the SCP. I believe that a paper with these spectra will be submitted in 2004, but it is not yet in draft form so it would be premature to cite this as a paper in preparation.
4. We have plotted it, and I've attached the plot. As can be seen, there are no significant trends in stretch with redshift. Figure 13 shows the more basic comparison of the stretch range for the low-redshift versus high-redshift supernova sets.
5. We agree with the sentiment of the comment-- although we would be a bit surprised if U-B=-0.5 turned out to be a better choice than -0.4, for reasons discussed in the paper. However, because given the data available we do believe that value still to be plausible, we have used that value to set the limits on any systematic error from this color assumption. Because of the sparse quantity of published U-B colors of low-redshift supernovae, we have made a point of insuring that the colors we are using are at least consistent with what appears in Jha's thesis. We look forward to the publication of those data and any other low-redshift U-B data in coming years, as that will help nail down this one issue, which currently contributes to our quoted statistical and systematic uncertainties.  
[[[Rob: I assume that this is correct, i.e. that it contributes to \*both\* systematic \*and\* statistical uncertainties.]]]
6. The reason for the mismatched parentheses is that the parameter space sampled did include the lower limit, but not the upper limit. This is a very fine point, however, and it would make no practical difference to the results had we taken the grid out that one additional pixel. As such, since there would be no \*effective\* inaccuracy in just using square brackets on both sides of the range, if for typesetting and aesthetic reasons the symmetry is preferable we will not object. For the time being, the asymmetric parentheses

have been left as is.

7. [[[Note that we have \*not\* had any discussion with Farrah, but rather are confidentially refereeing a paper, so I propose changing the following wording slightly:]]]

We have had a similar ~~discussion with~~ concern about this suggestion of Farrah, but have found his

arguments to rely on a ~~biased reading misreading~~ of the literature. Our modelling using ~~the th-e~~ newest Galactic dust and stellar scale-  
~~heights~~ heights

from Drummel and Spergel give results which agree with Hatanal et al and which also fit with the Phillips 1999 SN extinction distribution slightly better. Therefore, we think this point is consistent with the latest literature. Further, part of our argument is that in fact the contours you get when using a prior is sensitive to the details of the prior you use, and as such we recommend caution with that approach.

8. We've added the following sentence to the relevant paragraph to address this comment: "This higher incidence of extincted SNe at the low-redshift end of our sample ~~arises because in~~ is consistent with expectations for a flux-limited survey, where extincted supernovae will be preferentially detected at lower redshifts." The next sentence (which says that a simulation using the Hatano distribution and the survey flux limit is consistent with the E(B-V) vs. z distribution seen) is left as is (except for the addition of a transition word). We have also removed the words "trend of" between "show no" and "anomalous negative E(B-V)" in the abstract.
9. The reference to the "full set" is left over from an earlier draft, and should have been omitted. We've edited the text accordingly. (The complete set is discussed briefly in Section 5.1.)
10. In fact we do want to stay away from  $H_0$ ; even  $\text{script}_M$  is measured primarily (although not entirely) by the literature data on low-redshift supernovae, and it better represents the nuisance parameter we are getting directly from our fits to the data than does  $H_0$  (which would require an input value of  $M_B$ ).

11. These have been fixed.

12. Both of these upper limits are weak due to the noted fact that  $w$  is not well-bounded from below. As may be seen in the top row of Figure 11, the extinction-corrected 99% confidence interval on the 2-d plot does in fact close off at  $w \sim -1.7$ ; however, this is a reflection of the large probability for very negative (and probably implausible) values of  $w$ . An extinction-corrected fit which only considers  $w$  down to  $-2$  (effectively, a prior that  $w > -2$ ) has very similar outer contours, but the inner contour does not close off at  $w < -1$ .

We drove by the supernova-only upper limit on  $w$  quickly because of we don't consider it terribly meaningful by itself precisely for these reasons. We've edited the text of the paper in the first paragraph of Section 4.3 to make these issues clearer, breaking it into two paragraphs.

13. We've added a parenthetical comment with the chi-square value from the no-stretch-correction fit.
14. (This is the last sentence of the first full paragraph on page 32.) We've broken it into two different sentences, hopefully making the text read better. [[[Rob: I can't find what this is referring to, in either the originally submitted draft, or the current post-submission draft.]]]
15. Following the suggestion, we've rewritten the last paragraph of Section 5.7 ~~to read~~. The relevant replacement text reads:  
 "Figure~\ref{fig:stretchplot} shows that the HST high-redshift supernovae are found at similar stretches and luminosities as the low-redshift supernovae. The low- and high-redshift samples are consistent with the same stretch-luminosity relationship, although it is primarily the low-redshift supernovae ~~which require~~ that prefer a non-zero slope for this relationship." [[[Rob: Do the high-redshift SNe support this slope at all?]]]
16. Following the suggestion, we've rewritten the sentence to "For the current data sample, the above mentioned sources of systematic uncertainties are difficult to quantify at present, but are believed to be subdominant in the total error budget."
17. We've fixed the two noted problems in the reference list.
18. A brief paragraph sentence has been added to the last paragraph of Section 4.2 ~~which mentions that cites~~ the Tonry 2003 results: "Recent data on eight new high-redshift supernovae from \citet{ton03} (not included in this fit) are consistent with these results."

In addition to the comments from the referee, we've made the following minor changes to the paper:

- \* We've added panel labels a through f to Figure 11, and have changed the caption and the text of the paper which refers to this Figure accordingly.
- \* Footnote 30 was changed from  $\Omega_M h^2$  (which is incorrect) to  $\Omega_M h$ .
- \* In one place, we had a positive-side error on the low-extinction value of  $w$  of 0.14, but it should have been 0.15. We've made the correction. ~~(Everywhere else the number appeared, the right error bar had been cited.)~~ (It was correct everywhere else in the paper.)
- \* Section 4.3, paragraph starting "As both of these measurements show mild....". We have added a quote of the best fit value of  $\Omega_M$  from these fits. (No new fits were done; we've just extracted the other obvious value from the existing fits.) A sentence was added here, and also to the last numbered point in the conclusion.
- \* Minor cosmetic change: we fixed a cosmetic bug in Figure 3 (a line at

N=0 in the top two plots was extending past the limits of the plot), and changed the shading and line style of the contours in Figures 7 and 10.

\* The penultimate paragraph of Section 2.1 had some text added to describe the ground/space consistency: [[[Missing open quote:]]] "We have compared our ground-based aperture photometry with our HST PSF-fitting photometry using the limited number of sufficiently bright stars present in the PC across the eleven SNe fields. We find the difference between the HST and ground-based photometry to be  $\pm 0.02$  in both the R- and I-bands, consistent with no offset. The correlated uncertainties between different supernovae arising from ground-based zeropoints based on the same calibration data, and between the HST supernovae (which all share the same zeropoint), were included in the covariance matrix used in all cosmological fits (see \S~\ref{sec:cosmofitmethod})."

NOTE TO COLLABORATORS: In the actual message sent to the editor, the rest of this text will probably be replaced with just "Small textual changes; contact the author if you require an exhaustive list."

\* Small textual changes:

- Added "Team" after "High-Z Supernova Search" in Introduction.
- Rewrote the last sentence of the abstract for clarity.
- Rewrote the last sentence of the first paragraph of the introduction for clarity.
- 2nd paragraph introduction, added commas around "and of high-redshift supernovae" to make the sentence more readable.
- "...make their observed brightnesses dimmer...": added the "es" on brightness
- in the same paragraph, added "low-redshift" before "SNe Ia" in "...known colors of low-redshift SNe Ia"
- Wherever there was a long dash (---), spaces before and after the dash were removed. I believe this is proper typesetting practice.
- in the paragraph in the introduction about the Sullivan et al. 2003 work, replaced ", confirming" with "and confirmed"
- At the end of that paragraph, replace "which will allow us" with "that allow us"
- Section 2.1, paragraph starting "A single Tiny Tim...", in that sentence replace "band" with "filter"
- fixed a "the the" in section 2.2
- In the paragraph describing the generation of lightcurve templates, add "observer-frame" before "days relative to the epoch of..."

- Paragraph on the two SNe at  $z \sim 0.18$ , replace "R-band (rest-frame V-band)" with just "rest-frame V-band"
- Last paragraph of 2.2, add "for each supernova" after "all of the ground-based points" and "each of" was added after "used to scale"
- First paragraph of 2.3, replace "filter response" with "system response"
- Later in that section, replace "the data is not determinative" with "the data are not determinative"
- Section 2.5, first paragraph: remove a gratuitous comma after "host-galaxy extinction corrections"
- Second paragraph of 2.5, remove "out" after "cull"
- First paragraph of section 3, add a "(discussed below)" after the first mention of Figure 3.
- Second paragraph, Section 4.1, rewrite third (now fourth) sentence for clarity; add a sentence before it re: low-redshift supernovae.
- End of that paragraph, replace "fits to" with "results for"
- Slightly rewrite last sentence of section 4.2.
- Section 4.3, first paragraph, remove "down" from the last sentence.
- Penultimate paragraph of that section, add "mild" before "correlations" to the first sentence.
- Last paragraph of section 5.3, replace "we are less likely" with "the current results are less likely"
- Section 5.6, first paragraph: moved the last sentence to just after first one.
- Section 5.7, second paragraph, slightly rewrite the sentence starting "Likewise, the lightcurve rise-time..."
- Conclusion, point 4, add "recent" before "CMB data"
- Acknowledgements: replaced "CTIO 4-m" with "CTIO 4m".
- Typos fixed in references (Goldhaber 2001, Goobar et al 2001)